

SMARA UPDATE

The Quarterly Newsletter of the Department of Conservation, Office of Mine Reclamation

The AMLU's Record-Setting Six Months

The Abandoned Mine Lands Unit (AMLU) has been remediating hazardous abandoned mine features in California since 2002, using a variety of techniques, including polyurethane foam (PUF) plugs, bat gates, bat cupolas, culvert gates, backfills, and fencing. Between 2002 and 2005, the AMLU remediated, on average, about 50 abandoned mine features at 17 mine sites each year.

Given a new source of funding combined with new and renewed partnerships, the AMLU is off to its most productive remediation period ever. In the six months between January and June 2006, the AMLU remediated 106 abandoned mine features by completing 29 different projects with 15 different partners. These numbers are especially impressive when the season's exceptionally high snow levels are taken into account. Many projects had to be postponed until the snow melted and the remediation sites were accessible.

A New Funding Source

The AMLU's primary source of funding for abandoned mine remediation projects is the gold and silver mining fee, which was established by Senate Bill 649 (Kuehl et al., 2003). Working with its many partner agencies, which typically contribute funds or in-kind services, the AMLU has leveraged State dollars by nearly 100 percent, remediating many more hazards than it could have done solely with its own resources.



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Reclamation Success Stories at Teichert Sites

Teichert's Barry Baba has been supervising the habitat restoration of mined lands and the enhancement of other Teichert properties for nine years. On May 10, he gave OMR Reclamation Unit staff a tour of a few of the successful mine reclamation, mitigation, and enhancement projects he has been involved with around the Sacramento area.

The first site visited was Aspen IV, a quarry site south-east of Sacramento. A portion of this site has been reclaimed as an athletic field for the adjacent Rosemont High School. Berms and a detention basin for the school and nearby residential community are being revegetated with native grasses, native shrubs such as redbud and coffeeberry, and native oaks, providing an aesthetic benefit and environmental education opportunity for the students.

The second project visited was the nearby Aspen V site. This mine had been reclaimed as grazing land, and vernal pools were created here as mitigation for impacts at another site. Vernal pools are seasonal wetlands that fill during the winter rains and dry out by summer. They support a community of plants and animals adapted to this brief cycle, including rare species like the federally listed vernal pool fairy shrimp (threatened) and tadpole shrimp (endangered). Vernal pools have been destroyed throughout much of California by development and agriculture.



Rosemont High School athletic facilities at the Teichert Aspen IV site, with purple needlegrass and valley oak in the foreground.



Beth Hendrickson, Karen Wiese, and Leah Miller examine vernal pool flowers with Barry Baba (standing).

About 120 vernal pools cover 16 acres of the 100-plus-acre Aspen V site. The pools were constructed in compacted backfill material using a 12" clay layer to create an impermeable bottom, and then covered with a thin layer of topsoil brought from the impacted pools. The soil from the old pools contained seeds of vernal pool plants as well as the dormant life stages of the vernal pool invertebrates. The result is a spectacular spring display of vernal pool plants, and populations of fairy shrimp and tadpole shrimp in the constructed pools that are currently higher than in nearby natural pools used as reference sites. Barry anticipates that the majority of the constructed vernal pools will be successful.

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At the Haller Pit near Cache Creek in Yolo County, Barry showed OMR staff a riparian restoration project that he took over as one of his first projects at Teichert. After the failure of a previous restoration effort, Barry brought in three to five feet of dirt to lay down on top of the gravelly pit floor and replanted a diverse mixture of native riparian trees and shrubs with blue wild rye and purple needlegrass. These plantings are now six to eight years old and have formed a dense riparian habitat.

Many of the 300-plus elderberries at the Haller Pit have been colonized by the endangered valley elderberry longhorn beetle (VELB). The beetles mature for two years as grubs in the stems of the elderberries, leaving a characteristic round 1/4" hole when they exit the stem as adults. Barry found more than 90 VELB exit holes in a recent survey of the site.

Weed control is a constant battle, and Barry is always on the lookout for exotic species at his sites. He pointed out that controlling weeds from the outset and continued maintenance are key elements in successful restoration. Once the native species have filled in and become dominant, the occasional weed is easier to deal with. At the Haller Pit site, non-native annual grasses are competing with the native wild rye and needlegrass that Barry planted. As the canopy matures, however, it should shade out the annuals. The yellow star-thistle that previously infested the site has been nearly eradicated by Barry's persistent weed control efforts over the last three years.



Tall cottonwood trees at Teichert's Haller site are only six to eight years old.

Barry employs several tools in controlling weeds at his sites, from mowing to selective herbicide application to hand-pulling. He has found Transline® to be very effective against yellow star thistle and other thistle species. Once an initial infestation has been knocked back, Barry returns regularly to check and take care of any newly germinated weeds.

The fourth site on the tour was Coon Creek near Lincoln. Here Teichert has done restoration work in the creek and adjacent riparian zone, created vernal pools in nearby uplands, and planted screening native vegetation at key viewsheds, even though no mining has yet taken place on its properties there. Barry maintains a nursery at his office on this site, where he propagates native shrubs and trees from seed that he collects locally for each project.

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TEICHERT RECLAMATION *(Continued from page 3)*

At a bridge crossing Coon Creek, Barry demonstrated the remarkable results of passive riparian restoration efforts, specifically removing cattle out of the creek corridor and installing more than 3,000 feet of fencing. A picture taken from the bridge nine years ago shows a very degraded creek with eroded banks, little vegetation, and significant sediment runoff during the winter months. Today, the same viewpoint reveals a green oasis of established riparian vegetation and clear water. Oaks, elderberries, and other associated native species were planted and irrigated on the upper banks as part of an active restoration component. Weed management to remove



Coon Creek prior to fencing, with bare, eroding banks.



The same view of Coon Creek after nine years of cattle exclusion.

invasive plants, such as perennial pepperweed and *Arundo*, are also a large component of the creek restoration management plan.

Teichert owns more than four miles of property along Coon Creek. It plans to restore the riparian habitat throughout this property, eventually turning it over to a planned Coon Creek Conservancy modeled after the Cache Creek Conservancy (also a former Teichert reclamation site in Woodland that was donated for conservation).

The roadside stands of native trees and shrubs that Barry planted for visual screening of the proposed mining site at Coon Creek are impressive. Many companies use fast-growing, non-native trees for screening, but Barry and Teichert agreed that native vegetation would be better for habitat and the overall aesthetic value of the site. The screening areas look like botanical gardens, with a diversity of native shrubs, trees, and grasses planted in pleasing groupings. At one of the screening areas, Teichert had been unsuccessful in establishing woody vegetation until Barry determined that a hardpan layer under the soil was preventing growth of the plants. He had the area deep-ripped (four feet) and replanted with native plants, which are now going strong.

The last site visited was the vernal pool creation project on old grazing fields at the northwest end of Coon Creek. More than 100 pools were created by excavating naturally shaped depressions in

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the clay soil and adding back an inch of reserved topsoil. No vernal pool soils were available to inoculate the site, but nonetheless, after two years, vernal pool vegetation began to appear, and after four years, the majority of the pools were successfully established. At this point, they appear completely natural; the only sign of human intervention is the stake in the center of each pool for measuring water levels. According to Barry, 100 percent of the created pools at this site are functioning vernal pools.

Teichert's successful projects illustrate the results of a well planned, proactive, and committed approach to mine reclamation. Barry and his employer are determined to get it right, even going back and starting over on some sites to correct underlying issues such as a soil hardpan or insufficient topsoil that was interfering with revegetation success. Their commitment to reclamation has earned Teichert dividends in terms of good community relations as well as an excellent reputation among regulatory agencies.



A created vernal pool on the Coon Creek site showing typical concentric rings of flowers; these are goldfields, downingia, and popcorn flower.

Do you know of other **Mine Reclamation Success Stories** or unusual end uses? Let us know so we can feature them in upcoming issues of the *SMARA Update*. Email your ideas to: SMARAEditor@conservation.ca.gov

Beth Hendrickson
Environmental Scientist
Photos by Jim Pompy and Leah Miller

AMLU (Continued from front page)

Partners

The AMLU's remediations occur in coordination with public land-owning agencies, including the California State Lands Commission, the State Department of Parks and Recreation, the Bureau of Land Management, the U.S. Forest Service, and the National Park Service. Since the Department of Conservation does not own land, it works with other public entities that have abandoned mine features on their property. These remediation projects would not happen without the hard work and expertise that partner agencies bring to the table. Several of the AMLU's partners build their own closures, but others do not have the resources to do this. In such cases, the AMLU can provide experienced contractors to do the work. One of the AMLU's contractors, Frontier Environmental Solutions, also set a record by completing 10 projects and 19 features in six months.

2006 Projects

One of the remediation projects that the AMLU completed in January, with the assistance of Frontier Environmental Solutions, was at the Stonehouse-Hodge Mine in Riverside County. Biological surveys performed by Brown-Berry Consulting revealed that this site was special. A large colony of bats, specifically Cave Myotis (*Myotis velifer*), was known to use the mine in the spring. The surveys, conducted during the winter months, determined that the Stonehouse-Hodge mine com-

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AMLU (Continued from page 5)

plex also contained the largest known colony of California leaf-nosed bats (*Macrotus californicus*) in the United States. AMLU staff also found an extremely hazardous winze (vertical shaft) just inside one of the two adits. The bat gates installed at this mine site not only will protect the public from the dangers associated with abandoned mines, but also will preserve and protect these bat colonies.

In late April, the AMLU held a bat gate training class at the Aeroplane Mine in Inyo County in conjunction with the Inyo National Forest, the Bureau of Land Management's Bishop Field Office, Bat Conservation International, and Frontier Environmental Solutions. The AMLU's third co-sponsored class in four years was designed to teach interested people the techniques of producing top quality bat gates (used in horizontal openings) and cupolas (used in vertical openings) to preserve habitat such as the Stonehouse-Hodge mine. Participants received hands-on training that included the use of cutting torches and welders. Everyone was exhausted by the end of the training, but the smiles, combined with the high



One of the newly completed bat gates at the Stonehouse-Hodge Mine in Riverside County. This site is the largest winter roost for California leaf-nosed bats in the United States.

Photo by Ed Winchester



The graduating class of the 2006 Bat Gate Training Workshop held in Inyo County.

Photo by Sam Hayashi

quality of the completed bat gates, reflected the true measure of the success of the class.

The AMLU set another record at one of the sites of the bat gate training class. Besides having several adits and shafts, the Aeroplane Mine had two extremely large stopes that opened to the surface above the other workings. Several tire tracks were evident just a few feet away from the edge of these hundred-foot drops. The AMLU worked with the Inyo National Forest staff to install the longest fence the AMLU has

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put up to date: more than 700 feet! In just two days, staff stretched smooth wire between newly installed T-posts to warn people of the nearby danger.

One of the last projects to be completed before June 30 was on the Western States Trail just outside of Michigan Bluff in Placer County. About one week before the annual 100-mile endurance race that occurs along the trail, the Tahoe National Forest was alerted to some abandoned mine workings that had opened up to reveal an undercut hole on the trail. Staff of the AMLU and the Tahoe National Forest went out the next day to see what could be done. They decided that the best closure method would be to fill the hole with polyurethane foam. This would stabilize the trail and provide a permanent closure. Five days later, staff of



This is one small segment of a 700-foot long fence constructed by the AMLU and Inyo National Forest staff at the Aeroplane mine near Bishop, California.

Photo by Jon Mistchenko



Three days before the annual Western States 100 Mile Endurance Race, AMLU, Tahoe National Forest and Western State Trails Association staff closed this dangerous mine collapse on the course near Michigan Bluff in Placer County. Shown here is the polyurethane foam plug awaiting a cap of native material.

Photo by Jon Mistchenko

the AMLU, the Tahoe National Forest, and the Western States Trail Association pulled off the quickest remediation response to date, and the race went off without a hitch.

Next Steps

The AMLU now is setting out to maintain its pace of successful remediations. Many remediation projects are already scheduled for the upcoming months, recently hired staff are being trained to develop more projects, and the AMLU is conducting outreach to identify additional partners who can benefit from our services. This upcoming year will have lots of new work headed in the AMLU's direction, a challenge it both accepts and appreciates.

*Sam Hayashi
Research Analyst II*

Overcoming the Challenges of Desert Revegetation - Part I

The desert. Hot. Dry. Windy. Rocky. Not the most hospitable environment for growing plants. Yet the desert is not a uniform, barren wasteland. Hundreds of species of plants and animals have evolved to live here in a surprising variety of life forms, niches, and habitats.



Beavertail Cactus (*Opuntia basilaris*)

Photo by Leah Miller

The Mojave Desert is the largest desert in California, covering about one fifth of the state and supporting 1,400 species of plants. The Sonoran Desert, also known as the Colorado Desert, is lower and warmer than the Mojave, but receives more summer rainfall. Over 700 species of native plants are found here. Average annual rainfall in the desert is generally less than eight inches and often falls in widely spaced, intense events that can cause erosion and flash flooding.

The desert region is also home to the majority of California's active mines. When it comes to mine reclamation, techniques designed to capture precipitation, thereby increasing soil moisture, can greatly improve the success of revegetation efforts.

Re-surfacing Techniques

Shaping the surface by creating depressions that concentrate water dramatically increases seedling survival and plant establishment in arid ecosystems. Several innovative techniques have been developed over the last three decades that are suitable for economical desert reclamation. The main methods are ripping, imprinting, and pitting, but several names have been applied to a range of site preparation strategies aimed at manipulating the seedbed environment. Land sculpting, moon-scaping, surface roughening, water harvesting, or creating "safe sites," "microcatchments," or "flower pots" are all names you may come across in the reclamation and restoration literature. A variety of machinery and implements are used to employ these measures, including tractors, backhoes, scrapers, plows, tines, disks, and imprinting rollers.

Ripping involves pulling steel shanks through soils to break up compacted layers. This method helps to reduce the detrimental impacts of compaction and increase precipitation use efficiency. Compacted soils reduce infiltration, which leads to increases in runoff and erosion. Compacted sites recover very slowly on their own because it is difficult for plants to become established. Haul roads, processing locations, and other heavily used areas of mines are especially prone to soil compaction. Recommended depths for deep ripping are between 12 and 36 inches.

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Caterpillar tractor with ripping shanks.

Photo by Leah Miller

Imprinting uses heavy rollers to make an irregular furrow pattern in the soil surface. This method provides better infiltration and penetration of rainfall by increasing the roughness and openness of the soil surface. A summary of the beneficial functions of land imprinting are: 1) water collection and infiltration, 2) plant material mulching, 3) soil firming, 4) resource trapping and funneling, and 5) shielding seedlings from the extremes of the macroclimate. Soil imprinting has the added benefit of controlling runoff, erosion, and sedimentation. While imprinting is effective on steep or rough terrain, it is not suitable where soils are very rocky.

Pitting is a surface sculpting treatment used to create depressions that serve as rain catchment areas, increasing soil moisture and providing “safe sites” for seedling establishment. The capture and retention of precipitation in the pits can range from two to ten times that of open, untreated slopes. The best size and shape for the pit design should be determined by taking into account a variety of site-specific factors: soil type, slope, rainfall characteristics, runoff rate, requirements of species to be planted, and equipment availability.

The microenvironment within the depressions provides seedlings with some added protection from the desiccating effects of hot sun, dry wind, and sand blast. Additional benefits of soil pitting are enhanced erosion control and a more natural appearance of treated slopes that blend in with the surrounding topography compared to that of straight engineered slopes. The appearance of the “viewshed” is particularly apparent in open desert environments, with their unobstructed panoramic vistas. While trees and shrubs can disguise mine features in other habitats, there is little cover to hide disturbances in arid landscapes.

David Bainbridge, associate professor at San Diego State University and leader of the Desert Restoration Task Force, calls soil pitting “The most effective low cost method of dry land recovery.” Bainbridge recommends that, “Pitting should be more commonly selected as the preferred method for treating large areas of degraded lands and impacted soils in arid regions.”

Shaping the ground to capture and concentrate available rainfall has been very effective for vegetation establishment in deserts. As one Southern California mine operator put it, “This simple land-sculpting technique gave us high value at low cost.” Combined with the right choice of plant

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DESERT REVEGETATION *(Continued from page 9)*

materials and the judicious application of soil amendments -- which will be discussed in Part II of this article in the next issue -- well-designed site preparation strategies are the best approach to overcoming the challenges of desert revegetation.

Leah Gardner Miller
Senior Biologist, Botany

The roughened surface of this waste pile looks more natural than a smoothly graded slope. Shrubs are growing well in the bulldozed catchment basins, which concentrate rainfall and increase infiltration.

Photo by Leah Miller

A New Face at OMR

Mike Dwyer is the most recent addition to the Reporting and Compliance Unit. He returns to State service with more than 40 years of professional engineering geologic experience. After receiving his geology degree from UC Berkeley, Mike started his geology career with the California Department of Water Resources (DWR). He spent the next several years in northern California, mapping and assessing landslides, dam sites, tunnel alignments, proposed hard rock quarries, and borrow sites. After leaving DWR in the early 1970s, he spent the next 35 years in geotechnical consulting, including 15 years as the operator of his own consulting firm. His consulting experience includes a wide range of slope stability investigations, evaluations of active faulting, assessments of erosion hazards, and the preparation of regional landslide and fault lineation maps through aerial photo interpretation. During this time, he also prepared the geologic, seismic, and soils chapters of more than 150 environmental impact reports (EIRs), negative declarations, and focused environmental assessments. He has made numerous presentations to decision-making bodies and has provided pre-trial geologic services.



In the mid to late 1980s, Mike prepared the extensive hard rock quarry sections of the Resource Management Plans for both Sonoma and Lake Counties. During part of this time, he was chief geologist in charge of exploration and mine plan preparation for a mid-sized placer gold mine in Sierra County. In recent years, Mike has been active in preparing the geologic/geotechnical portions of surface mining and reclamation plans and EIRs for proposed and existing hard rock quarries.

Mike is a California licensed Professional Geologist and Certified Engineering Geologist. He is also an active member of the Association of Engineering Geologists and the Geological Society of America. Mike is pleased to have returned to state service and is looking forward to expanding his knowledge of mining and becoming more familiar with all aspects of SMARA.

When “Idle” Mines Report “Active” Status

It is not unusual for an active mine to cease mining operations temporarily because of market conditions or seasonal factors. But if these interruptions exceed one year, the reporting status of the mine may change from active to idle, and the mine operator may need to submit an Interim Management Plan (IMP) or commence reclamation of the site. A problem occurs when the operator of an idle mine does not file an IMP and continues to indicate an active status for SMARA reporting purposes. This can delay the identification of idle mine conditions and the proper administration of IMP-related provisions in SMARA, with potentially serious consequences for the mine operator. The Office of Mine Reclamation (OMR) is taking steps to ensure that such delays become a thing of the past.

Idle mines without IMPs can become abandoned. According to Public Resources Code (PRC) Section 2727.1, a mine is idle if surface mining operations are curtailed by more than 90 percent of its previous maximum annual mineral production for a period of one year or more, with the intent to resume mining operations at a future date. PRC Section 2770(h) provides that, within 90 days of a surface mining operation becoming idle, the operator must submit an IMP to its lead agency for approval. With limited exceptions, a mining operation that remains idle for more than one year without obtaining approval of an IMP “...shall be considered abandoned and the operator shall commence and complete reclamation in accordance with the approved reclamation plan.” If it is determined that an operator has abandoned its surface mining operation without commencing reclamation, the financial assurance for the operation may be subject to forfeiture (PRC Section 2773.1(b)).

Each year, mine operators must report production information, a key determinant of idle mine status, to the Department of Conservation (Department) in the annual report required by PRC Section 2207. They must also indicate their operation’s status as active, idle, reclaimed, or in the process of being reclaimed. In addition, mine operators must submit a copy of each annual report, without production information, to their lead agency.

Without production information, it may be difficult for a lead agency to identify and confirm idle mine conditions. If the operator of an idle mine does not file an IMP and incorrectly indicates an active status on its annual report, the lead agency may not immediately recognize that it is an idle mine. By the time the lead agency does recognize idle mine conditions, the mining operation may have already become abandoned under SMARA.

The Department’s SMARA database contains all annual report information submitted by mine operators, including production information. Recent queries show that a large number of mines have reported an active status with little or no annual production. Many of these “active” mines have reported zero production for two or more consecutive years. The Department will soon contact mine operators and lead agencies to determine the proper filing status of these mining operations and address IMP-related SMARA enforcement requirements. Looking forward, OMR is developing an automated process to alert lead agencies, without releasing actual production data, to significant changes in reported annual production by mine operators that may trigger the need for an IMP.

If you have any questions about the proper reporting of annual production information or mining operation status, please contact OMR’s Reporting and Compliance Unit at (916) 323-9198.

Douglas W. Craig
Assistant Director, Office of Mine Reclamation

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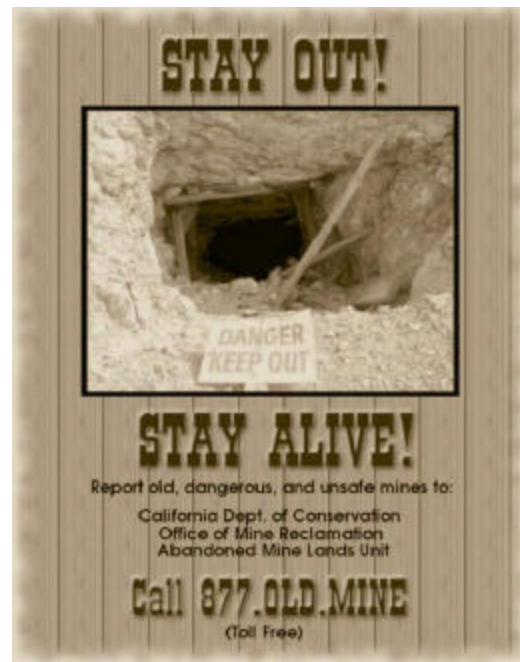
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The purpose of this publication is to impart the latest reclamation tips as well as changes in SMARA-related legislation or the interpretation of existing statutes by court decisions.

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2006/2007 SMARA Workshop Update

Due to some scheduling conflicts, the Bakersfield workshop originally scheduled for November 2006 has been cancelled. However, OMR will be holding a workshop in Sacramento in January 2007.

San Luis Obispo	City/County Library 995 Palm Street San Luis Obispo, CA	September 19 and 20
Mammoth Lakes	Community Development Center 439 Old Mammoth Road Mammoth Lakes, CA	October 19 and 20
Sacramento	Department of Conservation John Muir Conference Room 801 K Street, 20th Floor Sacramento, CA	January 17 and 18

You can register online at: <http://www.consrv.ca.gov/omr/workshops/registration.htm>

OMR - Ensuring mined lands are returned to a beneficial end use after mining.